Abstract

Design new materials in the nanoscale in recent years have very importance due to their wide applications in many fields. In this research, the solid phase ZnO nanoparticles / chitosan for preconcentration and separation of oxalic acid, tartaric acid and citric acid has been used. After solid phase extraction, the analysis was performed by high performance liquid chromatography. The hybrid of response surface methodology- genetic algorithm and hybrid of artificial neural network-genetic algorithm have been used to develop the predictive model for simulation and optimization of extraction process. The pH, amount of zinc oxide nanoparticles-chitosan, eluent volume, and sample and eluent flow rates were the input variables, while a multiple function (multiple responses, R_m) were the output. Two approaches for their modeling and optimization capabilities were compared. The generalization and predictive capability of both RSM and ANN were compared by unseen data. The results have shown the superiority of ANN compared to RSM. Under the optimum conditions, the detection limits of oxalic acid, tartaric acid and citric acid were 2.8, 2.3 and 3.5 µg L^{-1}, respectively. This method was applied to the preconcentration and determination of oxalic acid, tartaric acid and citric acid from biological samples.

Keywords: Solid-phase extraction, zinc oxide nanoparticles-chitosan, oxalic acid, tartaric acid and citric acid, artificial neural network, genetic algorithm, response surface methodology.

University of Zabol
Graduate School
Faculty of Science
Department of Chemistry

The Thesis Submitted for the Degree of Master of Science
(In the field of Analytical Chemistry)

Solid phase extraction of oxalic acid, tartaric acid and citric acid using zinc oxide /chitosan nanoparticles from biological samples

Supervisor:
Dr. Mostafa Khajeh

Advisor:
Dr. Mousa Bohlooli

By:
Mohsen Gharan

May 2014